IMPACT OF A HIGH-VOLTAGE TRANSMISSION LINE ON A NESTING PAIR OF SOUTHERN BALD EAGLES IN SOUTHEAST LOUISIANA

DAVID A. DELL AND PHILLIP J. ZWANK

ABSTRACT — To evaluate the impact of a 500th kv power transmission line on a pair of nesting bald eagles. *(Haliaeetus leucocephalus)* pre- and post-installation observations of eagle area-use were recorded. The mean of the daily proportion of eagle activity spent in the vicinity of the powerline decreased (P = 0.02) from pre-installation ($\bar{X}$ = 27.6%) to post-installation ($\bar{X}$ = 18.7%) seasons, indicating that activity patterns were changed after installation of the powerline. No serious physical threat to nesting eagles could be ascertained. The eagles regularly flew over and under the powerline, and perched and foraged near it. They never used the powerline itself for perching.

Wilcox (1979) reported on the success of a pair of Southern Bald Eagles *(Haliaeetus leucocephalus leucocephalus)* nesting 50 m from a 240th kv power line, however, quantitative data are unavailable on the effects of power transmission lines on territory use by nesting Southern Bald Eagles. The construction of a transmission line through the nesting territory of a pair of eagles in southeast Louisiana provided an opportunity to compare area-use by the eagles within the powerline zone before and after construction.

STUDY AREA AND METHODS

The Waterford-Churchill 500-kV line passes through Salvador Wildlife Management Area (SWMA), St. Charles Parish, Louisiana, at the northwest shore of Lake Cataouatche, approximately 14 km south of New Orleans International Airport. The line consists of steel self-supporting towers of an "H" design. Each tower is 30.5 m tall and supports 3 phase conductors 9.6 m apart. The conductors vary from 11 to 21 m above marsh level. Two smaller static lines are strung approximately 9 m above the phase conductors. Distances between towers vary, but they are 265-274 m apart in the study area. The powerline is approximately 600 m north of the eagle nest studied and centered in a corridor approximately 60 m wide that has been cleared of all trees. Construction occurred during summer (when eagles are absent from SWMA) 1983.

The eagle nest is in a living bald cypress *(Taxodium distichum)*, 32.9 m high and 107.4 cm in diameter above the swelling at the base (Dugoni 1980). An observation blind was placed approximately 320 m north of the nest during 1983-84, between the nest tree and powerline. In 1979-80, the blind was approximately 100 m closer to the nest (Fig. 1). From the blind, we could observe eagles flying over an area of about 810 ha. This area was a nontidal, permanently flooded, palustrine system (Cowardin et al. 1979) occupied by forested wetland (cypress and *Nyssa aquatica*), aquatic bed *(Bidens laevis, Eleocharis* spp., and *Sagittaria lancifolia* on floating turf; *Nelumbo lutea* and *Eichhornia crassipes* were free-floating), and unconsolidated organic bottom habitats.

We observed eagles twice weekly from dawn to dusk and recorded total minutes spent in various activities and areas. To analyze the effect of the powerline on the eagles' area-use, a "powerline zone" extending 400 m to the south and up to 1000 m north of the powerline was defined within the study area. The boundaries of the zone were chosen to include the perch trees and foraging areas close to the powerline, and because the eagles had to cross the powerline to reach the most frequently-used foraging area visible from the blind. The proportion of "eagle-minutes" (combined number of minutes that both adults were observed) spent within the powerline zone each day was used as the dependent variable in a randomized-block design analysis of variance to test for differences between pre-and post-installation seasons (treatments) and among periods of the nesting season (blocks). The periods of the nesting season we blocked on were brooding, pre-fledging (eaglets still in nest, but not brooded), and post-fledging (eaglets out of nest).

RESULTS AND DISCUSSION

Pre-installation observations were conducted from 3 January 29 to April 1980. During that season, 25 observation days were completed and 30,651 eagle-minutes were recorded (Shealy and Zwank 1981). Due to a lawsuit, construction of the powerline was delayed until summer 1983. Post-installation observations were for 4 January to 3 May 1984. Thirty-two observation days were completed, and 45,784 eagle-minutes were recorded.

The mean of the daily proportion of eagle-minutes spent by the adult eagles in the powerline zone decreased (P = 0.02) from pre-installation ($\bar{X}$ = 27.6 $\bar{X}$) to post-installation ($\bar{X}$ = 18.7%). Also, activity varied among the periods of the nesting season (P = 0.0004) (Table 1).

The eagles spent more of the brooding and pre-fledging periods in the powerline zone before installation than after. In the post-fledging period during both years, the eagles spent almost the same

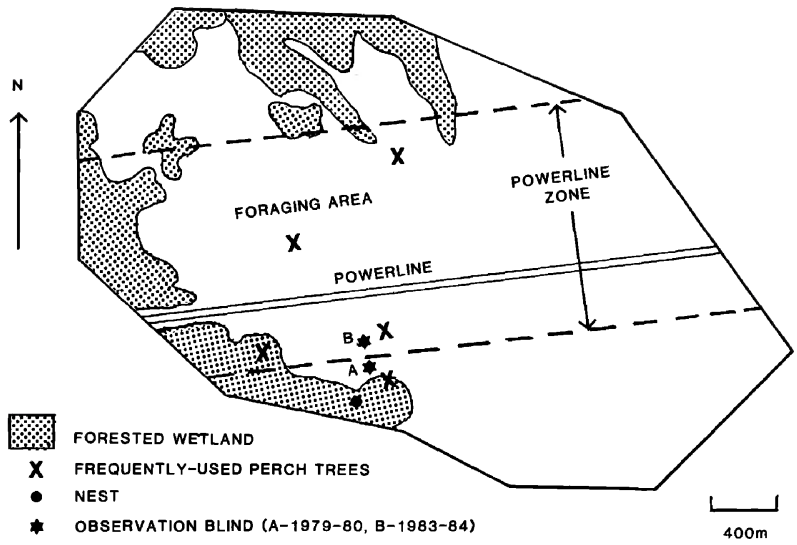

Figure 1. Area visible from eagle observation blind, Salvador WMA

proportion of time in the powerline area.

Activities within the powerline zone consisted of perching, soaring, foraging, or straight-line flight between perches. The eagles often flew over and under the conductors while going between the nest and various foraging areas. Herrick (1924) reported that one nesting pair of eagles regularly flew past "wires by the railroad."

We saw an eagle react to the powerline only once. While flying in circles 20-40 m above the marsh, an adult approached the wires several times, then banked quickly to avoid them. None of the eagles were ever seen perching on the transmission lines or towers.

Relocation of the observation blind in 1983 closer to a perch tree appeared to affect behavior. Use of this perch tree accounted for 1.3% of total activity in the pre-installation season (Shealy and Zwank 1981), but was never used during the post-installation season.

Table 1. Average daily proportion of eagle-minutes spent in the powerline zone in 1979-80 and 1983-84 and averages by nest period.

PERIOD	$\bar{X}$	SE	N[a]	CV%
1979-80	0.276	0.0350	25	63.3
Post-fledging	0.400	0.2006	4	100.3
Pre-fledging	0.254	0.251	14	37.0
Brooding	0.250	0.0386	7	40.9
1983-84	0.187	0.0418	32	126.7
Post-fledging	0.411	0.0806	11	65.0
Pre-fledging	0.082	0.0315	13	139.0
Brooding	0.048	0.0151	8	88.4

[a]Observation days.

Changes in area-use observed may have resulted from removal of potential perch trees from the powerline corridor, blocking of forage flights by transmission wires or changes in prey availability or distribution. Replacement of one or both members of the adult pair could also have influenced behavior; we cannot be certain that the same pair nested in both 1980 and 1983. Also, relocation of the observation blind changed perching habits, but its influence on use of the powerline zone could not be determined.

Based on our observations of eagles during flight, we do not think the powerline poses a serious physical threat to the nesting adults. Also, nesting attempts were successful before and after powerline installation. Possibly, however, awkward fledglings could collide with the powerline. Eagle electrocutions are unlikely because phase conductors are widely spaced (9.6 m) and we never observed perching on the powerline or towers.

FUNDING

This article is a contribution from the La. Coop. Wildl. Res. Unit (USFWS, La. Dept. Wildl. and Fisheries, La. State Univ., Wildl. Manage. Inst., and School of Forestry, Wildl., and Fisheries, LSU cooperating). Funding was provided by Louisiana Power and Light Co.

LITERATURE CITED

COWARDIN, L.M., V. CARTER, F.L. GOLET, AND E.T. LAROE. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildl. Serv., Off. Biol. Serv. 103 pp.

DUGONI, J.A. 1980. Habitat utilization, food habits, and productivity of nesting southern bald eagles in Louisiana. M.S. Thesis, Louisiana State Univ., Baton Rouge. 151 pp.

HERRICK, F.H. 1924. The daily life of the American eagle: late phase. *Auk* 41:389-422.

SHEALY, P.M. AND P.J. ZWANK. 1981. Activity patterns and habitat use of a nesting pair of southern bald eagles in southern Louisiana. Pages 127-135. *In:* R.R. Odom and J. W. Guthrie, eds. Proc. nongame and endangered wild. symp., Georgia Dept. Nat. Res., Game and Fish Div. Tech. Bull. WL5.

WILCOX, J.R. 1979. Florida power and light company and endangered species: examples of coexistence. Pages 451-454. *In* G.A. Swanson, tech. coord. The mitigation sym.: a national workshop on mitigating losses of fish and wild. habitats. U.S. For. Serv., Rocky Mt. Forest and Range Exp. Sta. Gen. Tech. Rep. RM-65.

Louisiana Cooperative fish and wildlife Research Unit, School of Forestry, wildlife and fisheries, Louisiana State University, Baton Rouge, Louisiana 70803

Received 15 December 85; Accepted 15 June 1986.

Third New England Regional Hawk Conference - The New England Hawk Migration Committee wishes to announce the Third New England Regional Hawk Conference will be held 4 April 1987 at the Holiday Inn, Holyoake, Massachusettes. Registration forms are available from HAWKS, P.O. Box 212, Portland, Connecticut 06480. There are special rates available for lodging at the Conference center. Registration will be limited.